

APPENDIX E

TRAVEL MEDICINE

References

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Travel Guidance

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Introduction

Travel medicine or "emporiatics" is a relatively new and rapidly developing field which relies heavily on up-to-date knowledge of area-specific health risks. A recent survey of North American travel health advisors found that immunization recommendations were inadequate or inappropriate in 20-75% of cases, 20-60% of antimalarial recommendations were incorrect, and issues such as altitude sickness, sunscreens and safe sex were infrequently discussed (Keystone, Dismukes and Sawyer).

This section contains a general discussion of issues to be considered in any traveler. More detailed information on various topics can be found in the references listed above.

Beyond these general considerations, the occupational medicine practitioner may be called upon to assess the fitness of an individual for overseas work where a more extensive review of physical and psychological factors would be required. Expatriates may be required to spend extended periods of time in underdeveloped areas where long-term public health issues need to be considered (Krieger and Balge). Large scale military undertakings can be expected to result in a variety of biological and non-biological exposures. For example, besides the expected disease risks, Desert Storm troops were exposed to oil well fire smoke. In these instances, the collaboration of preventive medicine and occupational health experts would be ideal. Although beyond the scope of this appendix, such issues are "travel medicine" in the largest sense.

General Considerations

Review the trip. Consider location (rural, urban), terrain, environmental threats, length and purpose of stay. What is the expected quality of food, water, accommodations and medical services? Assess the risk of exposure to disease vectors, animals and other health threats. Review the health status of the traveler with respect to underlying illness, allergies, medications and special considerations such as pregnancy. Plan far enough in advance to allow time for education, immunizations and general preparation. Ensure that immunizations and medications are documented in the traveler's health record.

Before leaving. Provide necessary immunizations. Advise traveler to begin prophylaxis if necessary, update insurance, wills, letters of instruction, powers of attorney and similar documents, establish points of contact (medical facilities, embassies) at destination, assemble appropriate clothing, required medications, first aid supplies, personal protection (sunscreen, insect repellent), hygiene items, other necessities (spare eyeglasses and contact lenses) and health records. The traveler must be prepared for culture shock.

While traveling. Injuries are the most common form of morbidity associated with travel, and for American travelers, traffic accidents are the most frequent cause of death. The traveler must know effective practices to prevent food, water, and vector-borne illnesses. Stress precautions against HIV infection and other sexually transmitted diseases (STDs). If necessary, employ strategies to moderate motion sickness and jet lag.

Upon return. Continue required malaria chemoprophylaxis. Depending on length of stay and perceived exposures, re-entry health evaluation and specific testing (e.g., PPD) may be justified. If illness occurs within a year of return, ensure that the complete travel history is related to the physician.

Immunizations

General. Immunizations are recommended because of exposure risks anticipated during travel or because they are required to enter certain countries. Evaluate the traveler thoroughly

regarding contraindications to immunization, including allergies (eggs, thimerosal), pregnancy (current or intended) and immunocompetency. Ascertain the general medical condition as well as any medication use.

Cholera. Currently, no country or territory requires cholera vaccination as a condition for entry, although local authorities may require documentation of vaccination. The current inactivated, parenteral vaccine has low efficacy. Food and water precautions are the major preventive measures.

Hepatitis A. The primary immunization for adults consists of one dose with a booster recommended six months later. Candidates for immunization include those likely to make repeated trips over an extended period to hepatitis endemic areas, and those residing in endemic areas. Immune globulin is an acceptable alternative.

Hepatitis B. The inactivated virus vaccine is indicated for persons living in an endemic area for more than six months, and those with a potential for sexual exposure or contact with local blood products. The vaccine series requires six months to complete. Immunization also protects against hepatitis D. There are no vaccines yet developed for the hepatitis C and E viruses.

Japanese Encephalitis (JE). JE is prevalent in areas where rice culture (mosquito breeding sites) and pig farming (animal reservoir) coincide. Vaccination should only be considered for persons who plan to live in areas where JE is endemic or epidemic, and for travelers whose activities include trips into rural, farming areas. Despite immunization status, personal protection should still be vigorously practiced.

Meningococcal Disease. Meningococcal vaccine is recommended for travel to areas with epidemic meningococcal disease. Sub-saharan Africa, from Senegal to Somalia is known as the meningococcal meningitis belt. Other areas of risk include Saudi Arabia, Kenya and Tanzania, Northern India, Nepal and some sub-Amazonian regions of South America. The quadrivalent polysaccharide vaccine is effective against serogroups A, C, Y, and W-135. It does not protect against serogroup B.

Plague. Travelers to India and other plague endemic countries in Africa, South America, and Asia are at low risk for infection. Use of insect repellents and avoidance of sick or dead animals are primary preventive measures. The inactivated bacterial vaccine is of unproven efficacy and, for adults, prophylaxis with tetracycline or doxycycline is preferred.

Rabies. Rabies is enzootic throughout the developing world and should be suspected in any animal bite, especially dogs. Pre-exposure prophylaxis with the Human Diploid Cell Vaccine (HDCV) is recommended in endemic areas if there is an occupational risk of exposure (hunters, forest rangers, taxidermists, laboratory workers, stock breeders, slaughterhouse workers, veterinarians and spelunkers). Administration of routine booster doses depends on the individual's exposure risk. Post-exposure treatment requires

thorough cleansing of all wounds with soap and water, and administration of both Rabies Immune Globulin (RIG) and HDCV. Anti-malarial agents (chloroquine and mefloquine) can interfere with development of active immunity following intradermal immunization, which is sometimes used as a pre-exposure regimen.

Smallpox. This disease has been eradicated worldwide, so no vaccination is required.

Typhoid. Although the majority of cases of typhoid fever in the United States occur among international travelers, it is still relatively rare. The live, oral form (Ty21a vaccine) requires refrigeration. The initial series takes a week to complete and cannot be given concurrently with oral polio vaccine or antibiotics. It cannot be given to immunocompromised persons. It may interfere with malaria chemoprophylaxis. The vaccine should be considered in travelers going to endemic areas for extended periods especially if going off the usual tourist routes. It is contraindicated in pregnancy. The acellular vaccine is given as a single IM injection for individuals two years and older.

Yellow fever. Human yellow fever is transmitted only in Africa and South America. Country specific vaccination requirements are published in the "Health Information for International Travel." An update of countries with active transmission of yellow fever (also cholera and plague) is found in the "Summary of Health Information International Travel (the "blue sheet") printed bi-weekly by the CDC. The yellow fever vaccine is an attenuated live virus vaccine grown in chick embryos. Boosters are required every ten years. The vaccine is contraindicated in immunocompromised persons, those with a history of allergies to eggs and in pregnancy.

Traveler's Diarrhea (TD)

Background. Traveler's Diarrhea usually refers to enteric illness acquired when traveling from an industrialized to a non-industrialized area. In general, TD will be experienced by approximately half of all travelers visiting developing countries. Bacterial pathogens are the most significant cause, especially enterotoxigenic E. coli (ETEC).

Prevention. Avoidance of high-risk food and beverages is critical for prevention of TD. The safest foods are those served at a temperature too hot to eat at first. In high risk areas, foods maintained at room temperature, milk (which may also cause brucellosis if unpasteurized), tap water, and ice are all items to be avoided. The decision to use chemoprophylaxis must be individualized for each traveler. The same drugs are employed as those used for therapy, but in half the recommended dose. In Mexico, trimethoprim sulfamethoxazole (TMP-SMX) may be used. In other high-risk parts of the world, fluoroquinolones are recommended for adults. Bismuth subsalicylate is a second option.

Therapy. Rehydration with fluids and electrolytes is the mainstay of therapy. For more significant disease, treatment

choices include bismuth subsalicylate alone, an antiperistaltic alone or in conjunction with an antimicrobial. When travel is to Mexico in the rainy season, TMP-SMX is the drug of choice. Antimicrobial therapy is not recommended for small children or pregnant women.

Malaria

Personal Protection. Arthropod avoidance and personal protective measures form the first line of defense against malaria. The most effective repellents for topical use contain DEET (N,N-Diethyl-m- toluamide). Clothing and bednetting impregnated with permethrin are effective in killing or repelling mosquitoes and other arthropods.

Chemoprophylaxis and Emergency Treatment. Chemoprophylaxis is a misnomer in that antimalarial drugs used during the period of exposure kill parasites in the erythrocytic phase, thereby preventing acute infection, but do not prevent ongoing hepatocyte infection. It is therefore necessary to continue prophylaxis for a period of weeks after leaving the malarious area to eradicate parasites emerging from the hepatic stage. Primaquine is taken to eradicate latent *P. vivax* or *P. ovale* infection in liver cells. Three drugs are available in the United States to prevent acute infection of erythrocytes: chloroquine, mefloquine and doxycycline. These are started before traveling in order to achieve adequate blood levels and to assess tolerance. They are continued during and after the exposure period for the reasons discussed above. If primaquine is indicated in the post-exposure period, the G6PD status must be known since severe hemolysis may occur if used in persons deficient in this enzyme.

For a traveler visiting areas where medical attention is not readily available, Fansidar (pyrimethamine/sulfadoxine) may be supplied for emergency treatment in the event of a febrile illness. Because of complex issues involving malaria prevalence, species predominance and drug resistance, access to sources of current knowledge is essential for proper recommendations.

Tuberculosis

Transmission of tuberculosis usually requires prolonged, close contact with an active case, and the risk to most travelers is therefore very low. However, for persons residing for more than a few days in developing countries, especially in areas of high AIDS prevalence, a pre-departure determination of PPD status is indicated. Since a reactive tuberculin skin test may take several weeks after infection to become positive, follow-up testing should be delayed for three months after return.

Leishmaniasis

Leishmaniasis is a parasitic disease found in tropical and sub-tropical areas of the world. It is transmitted by the bite of phlebotomine sandflies. Manifestation of the disease may take months, or in the case of visceral leishmaniasis, even years to

develop. No vaccines are currently available. As with malaria, outdoor activity should be avoided when biting is most active (dusk to dawn). Preventive measures are also similar (clothing, DEET, permethrin) except that the smaller size of the sandfly requires finer-mesh bednetting.

Schistosomiasis

Schistosomiasis is spread by contact with fresh water containing larvae (cercariae) released by infected snails. Effective treatment is available. Since there is no way to determine if water is contaminated, bathing in fresh water should be avoided in all endemic areas. If accidental contact occurs, vigorous toweling of the skin should be done immediately to reduce cercarial penetration. Swimming in chlorinated pools is safe, as is bathing in water allowed to stand for 3 days.

Dengue

Dengue fever is a viral disease transmitted by urban *Aedes* mosquitoes. The most common vector is *Aedes aegypti* (also the vector of urban yellow fever) an indoor breeder and daytime biter. There are four dengue viruses which do not cross-react. The disease is usually self-limited, and treatment is symptomatic. Dengue hemorrhagic fever (DHF) presents with the same symptoms as dengue fever but progresses to hemorrhage and hypovolemic shock. The risk to travelers is small, but in endemic areas precautions against mosquito bites should be taken.

Sunburn and Heat

The prevention of penetrating UV rays is essential in minimizing the effects on skin and eyesight. UVB radiation is responsible for tanning and burning skin. Drugs such as tetracyclines and sulfonamides can provoke a UVA phototoxic reaction resembling an exaggerated sunburn. Sun screens with a Sun Protection Factor (SPF) of 15 or greater should be used before sun exposure. Long-sleeved shirts, trousers and hats will also decrease UV penetration. Heat cramps, heat exhaustion and heat stroke are other potential hazards.

Sexually Transmitted Diseases

The most common STDs, gonorrhea, syphilis, Chlamydia and herpes are found worldwide. Others, such as chancroid and lymphogranuloma venereum are most often encountered in developing countries. In some areas of Africa, HIV infection in prostitutes exceeds 50%. While abstinence is the only sure prevention, the potential for sexual encounters needs to be realistically addressed. Guidance includes the use of latex condoms, spermicides and avoidance of high-risk practices such as anal intercourse. Hepatitis B vaccination may be indicated if travel is prolonged and sexual contact is anticipated.

Motion Sickness

The symptoms of motion sickness can be reduced by keeping the head stationary, watching the horizon and sitting in the most stable part of the vehicle. Medication to prevent motion sickness needs to be started before travel. The effects of scopolamine patches (Transderm Scop) may extend beyond the pharmacologic life of the patch. Their use is contraindicated in certain conditions.

Jet Lag

There is no apparent difference in the frequency or severity of symptoms (fatigue, insomnia, asynchrony in appetite and bowel function) going east or west if four or more time zones are crossed. For shorter trips going in the direction of the sun (east to west) may produce fewer symptoms. Avoiding excessive sitting, food and drink (except water which should be forced) is important.

Sleeping aids for flights greater than six hours may be helpful but the combination of triazolam (Halcion) and alcohol may produce retrograde amnesia. Sleeping aids are probably more useful after arrival. The traveler should assume local sleeping and eating schedules on the day after arrival and an acclimatization period of 1-2 days should be allowed at the destination before conducting business or further travel.

Altitude Sickness

Traveling in high altitudes (>8000 feet) may lead to a continuum of diseases beginning with acute mountain sickness (AMS) and continuing to high altitude pulmonary or cerebral edema. Individual susceptibility is highly variable. Travelers who are at greatest risk are those who ascend rapidly to tourist sites in the Andes and Himalayas. Climbers should spend a few days at 5000-7000 feet and then gradually ascend. Acetazolamide (Diamox) can hasten the process of acclimatization to high altitudes. The recommended dosage to prevent acute mountain sickness is 250 mg every 8-12 hours. The medication should be started 24-48 hours before ascent and continued during the climb. It may cause tingling in fingers and toes.

Individual Travel Issues

Pre-existing Illness. Persons with severe pulmonary disease should consider traveling by means other than flying which can make symptoms worse because of the reduction in available oxygen, low humidity, and secondary smoke. Cardiac patients should not fly if there is a history of recent myocardial infarction, unstable angina or uncontrolled congestive heart failure or arrhythmias. If flying is undertaken, supplemental oxygen should be ordered from the airline 2-3 days in advance. All required medications should be on board, not packed with checked luggage. Cardiac patients should also have a copy of a recent EKG. Changes in time zones and daily schedules will affect everyone taking medications. For diabetics, one option is to maintain the usual insulin schedule until

departure, snack frequently while traveling and monitor glucose every 6 hours, between meals and/or 2 hours after meals. Smaller doses of regular insulin can be used until arrival at the destination when the usual schedule may be resumed.

Pregnancy. The normal anatomic and physical changes of pregnancy expose women to various risks during travel. Since travel is associated with prolonged sitting, pregnant women should walk and stretch frequently to avoid the propensity for deep venous thrombosis. Air travel exposes women to pressures equivalent to 6000-8000 feet above sea level. The associated drop in arterial blood PO₂ may pose a risk to the fetus if the mother is anemic. Other problems include a reduction in placental blood flow if dehydration associated with low cabin humidity is not countered. Immunizations should be avoided, especially during the first trimester. Live viruses are contraindicated except when the risk of infection is unavoidable. Passive immunization with immunoglobulins is an acceptable alternative. Inactivated vaccines and toxoids are safe. Pregnant women are advised not to travel to malarious areas.

Tips and Traps for Vaccines for International Travel

- **Infants and children** traveling outside of the United States should be current on their routine childhood immunizations, and may need additional vaccines depending on their itinerary.
- **Adults >18 years** of age traveling outside the United States should be current on their tetanus-diphtheria vaccine (primary series and booster every 10 years). They may also need 1 or 2 doses of measles-mumps-rubella (MMR) vaccine (if born after 1956), influenza and pneumococcal vaccines (if >65 years of age or with certain underlying medical conditions), and may need additional vaccines depending on their itineraries.
- By International Health Regulation, only **yellow fever vaccine** may be required for a traveler to be allowed to enter a country. No country or territory currently requires cholera vaccination as a condition for entry. However, some local health authorities may require evidence of cholera vaccination.
- **Visa requirements may differ from entry requirements**, and may include tests, such as tuberculin skin testing and serologic testing for human immunodeficiency virus.
- Always **list the traveler's itinerary in the order** in which the countries will be visited. Some countries require yellow fever vaccine only if the traveler is arriving from an area infected with yellow fever.
- Always check both the yellow section of Health Information for International Travel and the biweekly Summary of Health Information for Internal Travel (also known as the Blue Sheet) for a listing of vaccination requirements and current **areas infected with yellow fever**.
- Only vaccine doses verified by **written documentation** should be counted. If vaccine doses are not documented, the person should be assumed to be unvaccinated.
- **All vaccines may be administered simultaneously**, except cholera and yellow fever, which should be separated by at least 4 weeks.
- It is not necessary to restart the series of any vaccine due to **extended intervals between doses**. However, vaccine doses spaced too close together may produce less than optimal protection. Consult Table 10 of the General Recommendations on Immunization (1994) to determine the minimum intervals between doses of a multi-dose vaccine.
- If **live virus vaccines** are not administered on the same day, they should be separated by 4 weeks. An exception to this rule is oral polio vaccine (OPV) which may be administered at any time before or after other live virus vaccines, including Ty21 a oral typhoid vaccine.
- **Live virus vaccines** require 2-3 weeks to produce an adequate immune response.
- **MMR and varicella vaccines** given prior to the first birthday should not be counted. The child should be revaccinated at 12-15 months of age.
- **Measles-mumps-rubella (MMR) vaccine** may reduce the response to PPD, so may lead

to a false negative tuberculin skin test (TST). MMR may be given before, or on the same day as a TST. If a MMR has been applied, TST should be delayed for at least 4 weeks.

- In general, live virus vaccines are contraindicated in **pregnant women**. Under some circumstances, yellow fever and oral polio vaccines may be considered. Inactivated vaccines may be administered to Pregnant women.
- **Immune globulin (IG)** may inactivate live measles-mumps-rubella (MMR) and varicella vaccines. These vaccines must be given at least 2 weeks before IG is administered, and delayed at least 3 months after IG is administered.
- Adults who have documentation of a prior complete series of **polio vaccine** need only a single booster dose after age 18 years. It is not necessary to give additional polio vaccine for subsequent travel. Adults >18 years of age who cannot document a complete series of polio vaccine as a child should be given a primary series of 3 doses of inactivated polio vaccine (IPV).
- The adult booster dose of **polio vaccine** should be the same type of vaccine (inactivated or live oral) the person received for the primary series.
- **Oral (Ty21a) typhoid vaccine** is inhibited by various antibiotics and by mefloquine (for malaria prophylaxis). Vaccination with Ty21 a should be delayed for at least 24 hours after administration of these drugs.
- **Hepatitis A vaccine requires** 4 weeks to produce an adequate immune response. If travel will begin in less than 4 weeks, traveler should be given IG in addition to hepatitis A vaccine.
- Whole cell **pertussis vaccine** is not recommended for persons >7 years of age.
- **Chloroquine** (for malaria prophylaxis) may reduce the response to human diploid cell rabies vaccine when the vaccine is administered intradermally.

Source: CDC. Health /information for International Travel **1995**; CDC. General Recommendations on Immunization. **Recommendations of the Advisory Committee on Immunization Practices (ACIP). 1994.**

CDC